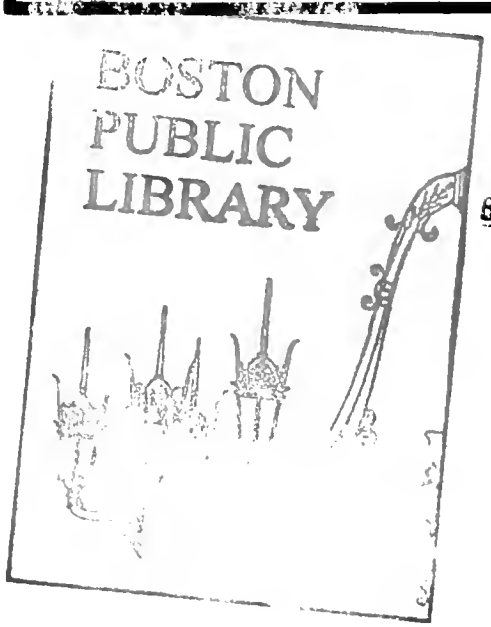
PROPOSAL FOR

TRANSPORTATION AND TRAFFIC ENGINEERING STUDY OF BACK BAY CITY OF BOSTON DEPARTMENT OF TRAFFIC AND PARKING



May 1985

Submitted to:
City of Boston
Traffic and Parking Department

Submitted by:

HMM Associates, Inc.
336 Baker Avenue
Concord, Massachusetts 01742

HMM Associates
336 Baker Avenue
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(617) 371-1692

May 6, 1985

Ms. Lisa Chapnick
Commissioner, Traffic and Parking
City Hall Square
Boston, MA 02201

Subject: Proposal for Transportation and Traffic Engineering Study of Back Bay
City of Boston
Department of Traffic & Parking

Dear Ms. Chapnick:

In response to the Traffic and Parking Department's RFP, HMM Associates is pleased to submit this proposal to provide transportation and traffic engineering analysis and services in the Back Bay area of Boston.

During the Traffic and Parking Department's evaluation of this proposal, we request that particular attention be given to the following:

- Approach to work, including our ability to provide services in a quick, cost-efficient and reliable manner;
- Capabilities and experience level of the Project Team; and
- Past experience on similar projects.

HMM is looking forward to working with the Traffic and Parking Department on this important project. We will be pleased to provide an oral presentation at your request. Please call me if you require additional information.

Very truly yours,

Scott T. McCandless
Vice President

STM:cs
Enclosures

PROPOSAL TO PROVIDE TRAFFIC AND TRANSPORTATION ENGINEERING SERVICES IN THE BACK BAY AREA OF BOSTON

HMM Document No. P-85-1103

May 1985

Prepared for:

THE BOSTON TRAFFIC & PARKING DEPARTMENT
City Hall Square
Boston, MA 02201

Prepared by:

HMM ASSOCIATES, INC.
336 Baker Avenue
Concord, Massachusetts 01742

LIST OF EXHIBITS

1. INTRODUCTION

HMM Associates is an engineering, planning and design firm located in Concord, Massachusetts. We specialize in environmental consulting, with a significant portion of our work devoted to transportation-related issues. Our studies have included:

- Data collection/review;
- Traffic impact analyses;
- Parking demand/supply;
- Vehicular access and circulation;
- Roadway layout/design;
- Pedestrian access and circulation;
- Improvement measures; and
- Highway safety analyses.

Our staff of transportation engineers and planners are experienced in analyzing all aspects of transportation facilities and their operation. Support is available from our interdisciplinary staff of landscape architects, noise specialists, air quality scientists, design engineers, community liaison specialists, architectural historians and staff technicians.

HMM has completed numerous studies in the City of Boston. We have developed a sound working relationship with the BRA as well as neighborhood groups in several parts of the City. Our technical work has always been accepted by the appropriate review authorities as well as neighborhood organizations.

Our proposal for the Boston Traffic and Parking Department includes:

- Our understanding of the problem;

- Our proposed approach to the work;

- A description of our project team;
- Our qualifications; and
- Our schedule and budget.

2. UNDERSTANDING OF THE PROBLEM

The Flynn Administration has made a serious committment to improve conditions in the City's neighborhoods. A major element affecting the quality of life in each neighborhood is the traffic circulation and parking pattern on its streets.

The City of Boston, through the Traffic and Parking Department, has decided to engage a consultant to assist in addressing the concerns of residents, merchants and City officials regarding traffic and parking issues in the Back Bay Community. The need for this particular study is a direct result of a BRA request to the Commissioner of Traffic and Parking to undertake a comprehensive study of the Back Bay. The BRA request is based on uncertainties concerning the impacts of planned development on future traffic operations.

The form of assistance desired by the City is the completion of a neighborhood transportation planning study for the Back Bay area. The purpose of this study is to inventory baseline conditions, identify current and potential transportation problems and develop possibilities for solutions, thereby providing better City services to the area. Similar studies are also planned for the East Boston, Charlestown and North End neighborhoods.

At the present time, the study area boundaries for this project are generally outlined as follows:

- North - Storrow Drive;
- South - Huntington Avenue and Herald Street;
- East - Charles Street; and
- West - Massachusetts Avenue, Charlesgate West and the Fenway.

These boundaries are illustrated on Exhibit 1. Specific intersections and/or roadway segments outside the aforementioned area, but deemed pertinent to traffic operations within the boundaries, will be included upon approval of the Traffic and Parking Department.

The transportation planning effort in the Back Bay will be led by the City's Traffic and Parking Department. A local working committee will be set up to provide guidance and input to the study. Committee members will include several representatives from the Back Bay Community, a single representative of the Traffic and Parking Department, and an official of the BRA. The Consultant will also be on the working committee, and will attend meetings as required. The Consultant will also be available to attend public meetings in connection with publication of draft and final reports. The working committee will have a major role in:

- Providing the link between the neighborhood and the City; and

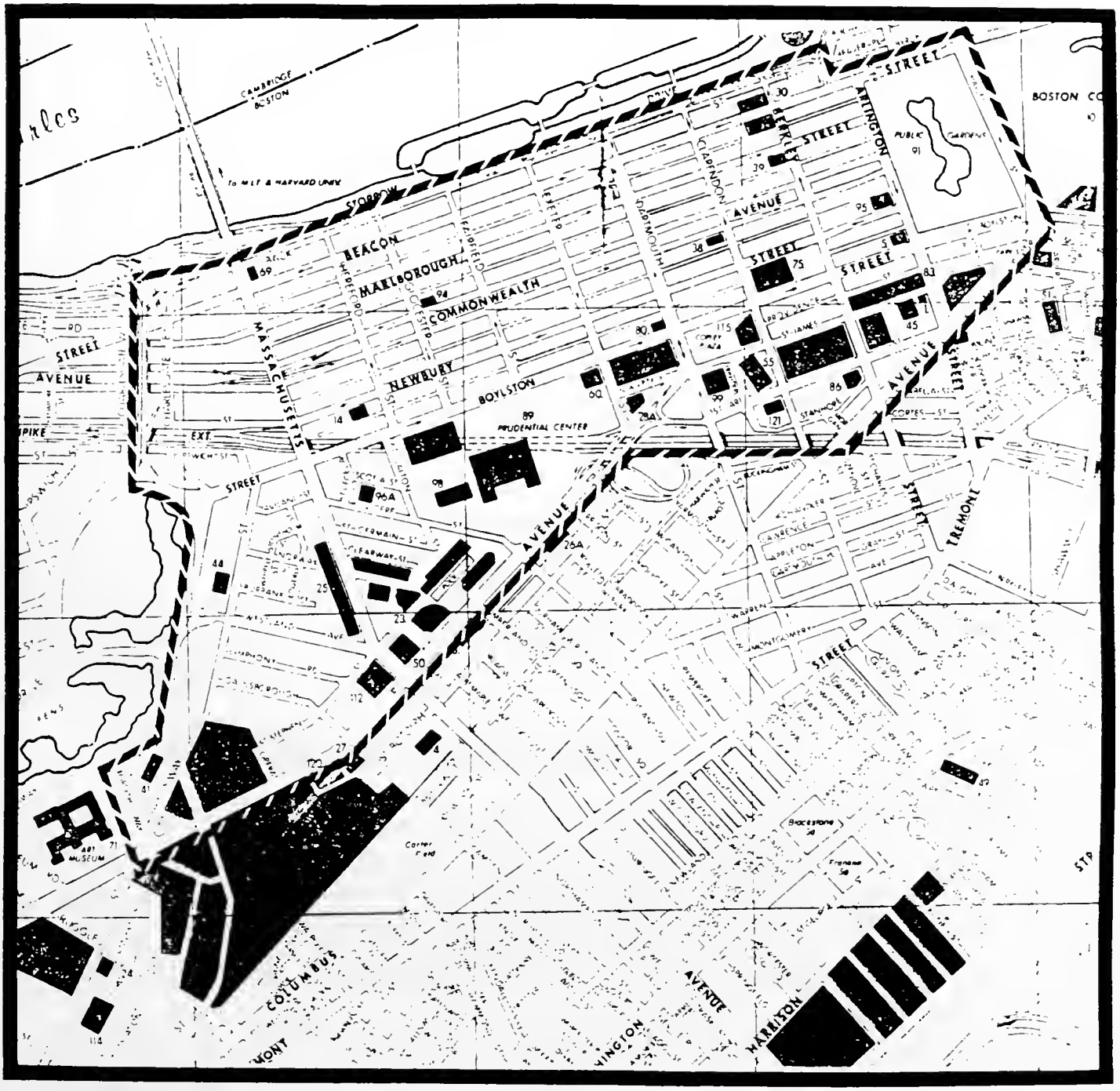
- Providing input on the issues and direction of the study.

The study resulting from this contract will provide a portion of the framework through which the Flynn Administration and the BRA can accomplish common goals and objectives regarding neighborhood growth planning and revitalization.

HMM Associates is familiar with the Back Bay area. We served as the prime environmental consultant for the Copley Place Project. We also contributed extensively to the EIR for the Hynes Auditorium Expansion Project. Our specific contributions included: (1) pedestrian access and circulation analysis; (2) evaluation of design alternatives; and (3) lead role in formation and guidance of Citizens Advisory Group and its activities. HMM has completed numerous other projects in the City of Boston, many of which involved extensive coordination with community representatives.

EXHIBIT 1

PROJECT STUDY AREA



3. RANGE OF SERVICES

Outlined below is a summary of HMM's broad-based capabilities in providing traffic engineering analysis and design services:

Data Collection

HMM owns and operates state-of-the-art machine and manual traffic recording equipment. HMM traffic engineers have developed the "Transoft" series of computer software to process and summarize these data. Use of our own traffic recording equipment and data processing software results in reliable and cost efficient traffic data. Data processing summary capabilities include location-specific printouts indicating 15-minute, 30-minute and 1-hour directional volumes, daily peak hours, average daily traffic (ADT) and vehicle classification.

Traffic Operations Analysis

HMM traffic engineers have developed a series of computer software programs to evaluate (1) peak hour traffic operations at signalized and non-signalized intersection locations; (2) operations along roadway sections; and (3) operations at ramp junctions and along weaving sections. Typical analyses also include evaluation of signal timing plans, evaluation of traffic signal warrants and assessment of vehicle queueing and vehicle delays.

Traffic Signal Layout and Design

HMM traffic engineers are experienced in evaluating the effectiveness of existing traffic signal timing plans, proposing alternative phasing strategies or designing new signal systems including the preparation of system specifications, cost estimates and contract documents.

Develop and Evaluate Improvement Alternatives

HMM staff is experienced in quickly evaluating the feasibility of potential traffic flow improvement, or mitigation, alternatives on a site or area-specific basis. These alternative improvement measures are developed and analyzed based primarily on: (1) traffic operations service levels; (2) land use patterns; (3) economics; and (4) citizen and group input. Typical improvement measures that have been evaluated include: (1) signal cycle and phasing changes; (2) one-way street systems; (3) lane reversals; (4) lane additions; (5) turn prohibitions; (6) pavement markings; (7) ride-sharing programs;and (8) use of alternative transportation modes. In-house computer software is used to evaluate many of these mitigation measures, facilitating a quick response time to our clients.

Parking Studies

HMM can perform a number of services related to parking needs, including evaluations of parking supply and demand, vehicle turnover rates and facility design.

Vehicle Access and Circulation Plans

HMM engineers can evaluate alternative vehicle access and circulation plans from the standpoint of operations and design. Accessibility, horizontal and vertical alignment, passing and stopping site distance, signage and construction costs are all considerations which must be evaluated for efficient and effective access and circulation plans. These plans can be developed on an internal (e.g., project site-specific) or external (community-specific) basis for automobile, truck, or any other vehicular traffic deemed important within the study area.

Pedestrian Access and Circulation Plans

HMM engineering and planning staff have experience in the development and evaluation of pedestrian access and circulation plans. Pedestrian movement operational levels, accessibility to parking areas, street scape amenities and construction costs are all considered in these analyses.

Highway Safety Analyses

HMM transportation staff is experienced in researching, compiling and analyzing accident data, including computer modeling of accident causality.

Expert Testimony

HMM traffic engineers have provided expert testimony at federal agency proceedings, state agency proceedings, and at Superior Court and local zoning board of appeal hearings.

4. APPROACH TO WORK AND STUDY DESIGN

The City's Traffic and Parking Department is about to undertake a transportation planning study in the Back Bay Community. The ultimate goals of this study are to:

- Reduce traffic levels on Berkeley Street between Newbury Street and Storrow Drive;
- Reduce overall traffic volume levels in the area by 1987; and
- Evaluate alternative vehicular access and circulation routes to the Southeast Expressway and Central Artery.

Due to the unique mixed residential/commercial use of the area, this study will be an important part of the City's program of neighborhood growth planning and revitalization. The study process will serve as an important forum for citizen and business involvement in communicating with City officials.

HMM Associates recognizes the importance of these goals. We have designed a workplan that fulfills these goals, while meeting the technical requirements for the study. Our proposed approach to the work is outlined below.

4.1 Inventory Traffic Facilities and Collect Existing Data

The first step in the study will be to collect all existing data available for the study area. It is expected that the recently completed New England Life/Gerald D. Hines EIR will be a major source of information for this study. Types and sources of data are shown in Exhibit 2. HMM Associates is familiar with each source of data at the State and local level since the majority of our studies require similar data collection efforts.

EXHIBIT 2
EXISTING TRAFFIC DATA SOURCES

Data Type	Source
Traffic Counts	MDPW Boston Traffic & Parking Department Private Studies: New England Life/Gerald D. Hines EIR Other EIRs
Safety Data	Boston Police Department MDPW MDC State Police
Geometric Data	Field Surveys Boston Traffic & Parking Department Maps and Drawings MDPW Maps and Drawings Signal warrants (available from Boston Traffic & Parking Department and MDPW)

Existing data and information will be compiled graphically on a map, and in a manner appropriate for a technical appendix to the planning study. Where no data exists for a key location, new counts may be required. We do not expect to undertake new counts at more than six locations for this study.

4.2 Identify Transportation Deficiencies and/or Problem Areas

HMM will review the data compiled under task 4.1. This review, combined with our familiarity with the Back Bay area of the City of Boston, will help us identify existing transportation problems. Types of problems expected include turning conflicts, through traffic volumes, truck traffic volumes, non-resident parking, roadway surface conditions, pedestrian access and circulation, streetscape/aesthetics, safety, and vehicular access and circulation.

This preliminary identification of problem areas will be augmented by those known by the Traffic and Parking Department. A preliminary graphic display of the trouble spots will be prepared to serve as a starting point for the local working committee input.

A working group meeting scheduled by the Traffic and Parking Department will be held to identify problems perceived by the community, and to complete the list of specific problems to be addressed. This first working group session will be important in setting the detailed scope of the study, and providing the framework for community involvement and technical effort.

The result of this task will be a written summary of traffic and transportation related problems in the neighborhood. Appropriate graphics identifying the areas to be studied will be included.

4.3 Assessment of Problems/Possible Solutions

A qualitative evaluation of the problems, along with a discussion of possibilities for solutions will be developed. Possible solutions will include those identified by the Traffic and Parking Department, its technical consultant HMM Associates, and other working group members. Each alternative will be evaluated and a recommendation provided.

HMM Associates' range of experience and expertise on the various technical issues that may arise is presented in Section 3, Range of Services. Depending upon the particular problems identified in the study area, we can analyze any of the issues listed in Section 3, as well as others. In each case, needs of both local residents and other user groups (visitors, commercial traffic, through-traffic) must be considered to provide a solution that can improve the quality of life in the neighborhood while not negatively affecting the capacity of major transportation facilities.

Problems and possible solutions can be expected to be the subject of several working committee sessions and iterations. The end result of Task 4.3 will be a written summary of each problem and a discussion of each possible solution. Each discussion will include the pros and cons of each suggested solution, including the preferences of different working group factions.

4.4 Develop Preliminary Recommendations

HMM Associates will review the problems and possible solutions identified in Task 4.3 and develop preliminary recommendations. Recommendations will be divided among short-term, medium-term and long-term options. Within each of these categories will be both physical and operational suggestions. Each recommendation will include a rough cost estimate and any other important considerations, such as Federal or State permitting or environmental requirements, that may affect implementation.

In general, short-term recommendations will include those options that can be implemented quickly (in less than one year) and cheaply. Long-term recommendations may be vastly expensive (Federally or State funded), extremely complex undertakings. Implementation of these alternatives may take many years. Examples of long-term improvement ptojects include: Central Artery Depression, Third Harbor Tunnel, etc. Medium-term projects may be physical construction projects that would take about 1 to 5 years to design and complete (e.g., Southeast Expressway Reconstruction).

4.5 Prepare Draft Report

The data collection and analysis activities outlined under Tasks 4.1, 4.2 and 4.3, as well as all preliminary recommendations will be documented in a draft report. A compilation of data collected and used as input toward developing these recommendations will be prepared as an addendum to the draft report.

4.6 Review and Comment on Draft Report

This task involves the review of preliminary recommendations with the Traffic and Parking Department, then with the working committee, and finally presenting them to the public. It is expected that this review and comment phase will provide guidance toward the type/extent of evaluation to be completed for the final report. Meeting summaries covering all working committee sessions will be included as an appendix to the draft report.

4.7 Collect and Analyze New Data

Based on discussions conducted or comments received on the draft report, HMM Associates will perform additional traffic counts and/or other data collection activities. It is expected

that comments received on the draft report will include suggestions for investigation of new improvement alternatives as well as more detailed evaluation of those already presented.

4.8 Prepare Final Report

A final report incorporating changes discussed under Task 4.7 will be submitted to the Traffic and Parking Department by the end of the contract period. This report will also include a more detailed evaluation of all preliminary recommendations outlined in the draft report.

4.9 Review and Comment on Final Report

The final report will be reviewed by the Traffic and Parking Department, the local working committee and the general public (i.e., in the form of a public meeting). It is possible that, as a result of this review, the Traffic and Parking Department may feel the need to expand the scope of the project to address additional improvement alternatives for the study area. If this decision is made, HMM Associates will be prepared to undertake the additional work under a revised contract agreement, as presented by the Department.

4.10 Implementation

HMM Associates has a full-range staff of engineers and environmental planners. We are capable of assisting with the implementation of our recommendations through design, state and local permitting and environmental review.

Our site engineers and landscape architects can design, estimate costs, provide construction documents and monitor completion of construction. Our environmental scientists and planners can determine any permitting requirements, develop a permitting strategy and timetable, and complete all necessary evaluations and documents.

5. PROJECT TEAM

Robert Klimm will be Project Manager and Principal Investigator in charge of this project for HMM, and will assume the responsibility as the key contact with the City's Traffic and Parking Department. Mr. Klimm has served as HMM's Project Manager for several traffic engineering studies in the Boston Metropolitan Area. He is familiar with the area and has a highly respected professional relationship with several key contacts at the federal, state and local level (e.g., FHWA, MDPW, DEQE, local planning boards). Mr. Klimm has also played a supervisory role in several projects completed by HMM under the guidance of the BRA (e.g., Hynes Auditorium Expansion EIR, 101 Federal Street Traffic Study, 150 Federal Street Traffic Study). He has also been HMM's liaison with Massport for a traffic count and data processing program on the Tobin Bridge. Prior to joining HMM Associates in 1980, Mr. Klimm provided traffic engineering and transportation analyses for numerous public and private sector projects while working at Fay, Spofford & Thorndike, Inc.

Paul Hajec will be the Principal Engineer and Analyst for this task. He has previously served in this capacity in several traffic studies and EIRs in the Boston Metropolitan Area. While at HMM, Mr. Hajec has also managed several of the smaller traffic studies completed by HMM (e.g., Dedham Medical Associates Expansion, Lordvale Acres Planned Residential Development). His work experience at the Merrimack Valley Regional Planning Commission makes him extremely aware of and responsive to public input as well as the importance of short-term TSM-type analyses. He has also worked as a highway safety research analyst, and has studied and written extensively on that issue. Mr. Hajec has key contacts at FHWA, MDPW, EOTC and several local boards in the eastern portion of the Commonwealth.

HMM will also provide planners, graphic artists and technical support staff with direct experience in performing short-term studies. This staff is familiar with field data

collection, computer data processing and presentation of findings (e.g., illustrations, report writing).

Support can be provided by HMM staff in the following technical areas:

Community Liaison - Margaret Briggs
Noise - David Keast
Landscape Architecture - Frank Vitale

Resumes of HMM's staff for this task are included as Appendix A.

6. QUALIFICATIONS

HMM feels particularly well suited to this contract for several reasons. The first is our base of experience in similar assignments. We have provided a wide range of traffic engineering and transportation planning services to deal with design and operational issues associated with real estate developments, commercial and industrial expansions, and transportation improvement projects of varying size and scope.

The skills of our staff are well matched to this assignment. HMM has traffic engineers experienced in each area of traffic engineering/transportation planning likely to be addressed under this contract. Our ability to perform all of the potential tasks required using in-house staff and computer software will facilitate product delivery in a quick, cost-efficient and reliable manner.

HMM's "Introduction to Services" brochure, which summarizes all of our project-related capabilities, is presented as Appendix B.

6.1 Related Experience

HMM's traffic engineers have broad-based experience in providing transportation and traffic-related services including:

- traffic operations analysis;
- traffic flow simulation modelling;
- development of vehicle and pedestrian traffic access and circulation plans;
- highway safety analyses;
- preliminary traffic control design;

- evaluation and development of Transporation Systems Management (TSM) programs;
- parking studies;
- truck circulation and routing analyses; and
- citizen, community group, and agency liaison activities.

Traffic operation analyses and simulation modelling are two of the major strengths of HMM's traffic engineering department. Almost every traffic study we have undertaken has required some level of capacity analysis.

HMM also has extremely strong capabilities in the evaluation and development of TSM programs, as well as in citizen, group, and agency liaison activities. The evaluation and development of TSM alternatives has become one of our strong points through experience gained in completing the "Mitigating Measures" section of several EIRs and local traffic studies. Staff members have become expert at liaison activities through continuous dealings with Federal and State regulatory personnel, local governing boards and private citizens. Our ongoing work in the Commonwealth's environmental review process has provided much impetus in this direction.

As an integral part of the EIR process, HMM staff has also worked closely with clients toward developing acceptable vehicle and/or pedestrian access and circulation plans. These plans have frequently included: (1) truck access and circulation; (2) automobile access and circulation; (3) parking lot studies and design; and (4) highway safety analyses.

Complex Project Coordination

In all of our traffic and environmental consulting work we coordinate with the project architects and engineers. In more

complex cases, coordination also involves numerous sub-contractors, or if we are not the prime contractor, coordination with the prime contractor. On the Copley Place project, for example, we had to coordinate with two sets of architects and three engineering firms since the main part of the project and the two hotels all had separate design teams. In addition, there were five sub-consultants working on the EIR/EIS. The analysis had to be coordinated with the MBTA Orange Line project and its impacts since it is adjacent to the Copley Place site. The UDAG grant for the project was applied for by the City of Boston, so the BRA reviewed and approved all aspects of the EIR/EIS before it was submitted to HUD. As the prime environmental consultant and project manager for the environmental process, HMM was responsible for coordination among all these parties.

We have undertaken several other projects with complex permitting requirements. These have included International Place, The Devonshire, One Financial Center, 150 Federal Street, One Franklin Place, Berry's Creek Center, the Hynes Auditorium Expansion and several more large suburban office development projects.

Public Presentations

The nature of our work as environmental consultants requires us to make frequent presentations to the public. Often this type of activity is associated with controversial projects where the EOEA sets up a Citizens Advisory Committee with regularly scheduled meetings open to the public. Projects with FHWA funding require an elaborate public participation program designed to aquaint the public with the project and its projected impacts. Examples of recent projects involving public presentations include the Hynes Auditorium, Copley Place, Baystate Medical Center and Codex Corporation Headquarters.

HMM has also been involved in more formal public presentations associated with adjudicatory hearings and

licensing board hearings for major industrial facilities and nuclear power plants. We have participated for example in public hearings for both the Harvard MATEP power plant and for Seabrook Station.

Transportation

HMM Associates' staff of transportation engineers and planners have extensive experience analyzing all aspects of transportation-related issues. These include vehicular circulation, mass transit impacts and parking and pedestrian circulation. Exhibit 3 lists our recent transportation projects. We have studied not only traffic and parking but other transportation-related issues. For example, we conducted an extensive analysis of transit impacts for One Financial Center. Given this projects proximity to public transportation (South Station) and limited parking availability, transit use was important.

For the Hynes Auditorium, our pedestrian analysis included provisions to account for "platoon flow" which can also be expected due to the arena element of this project. This pedestrian analysis has been cited as a model study by the BRA.

Air Quality

HMM Associates has extensive experience in transportation-related air quality analyses and permitting for a variety of projects. Our staff of atmospheric scientists and meteorologists have completed indirect source analyses for vehicular traffic on numerous projects including the Dewey Square Urban Systems Project for the BRA. Likewise we are familiar with DEQE permit requirements for space heating facilities, and emergency generators. Exhibit 4 presents a list of our recent air quality projects.

EXHIBIT 3

HMM ASSOCIATES

RECENT MASSACHUSETTS TRAFFIC AND TRANSPORTATION PROJECTS

PROJECT	CLIENT
Middlesex Community College: Traffic impact analysis for new college campus in Bedford, MA. Tasks included data collection, origin/destination and impact determination.	Division of Capital Planning and Operations Boston, MA.
Dewey Square Office Building: Traffic, public transportation and parking analyses were conducted as part of an EIR for a 1,000,000 SF, high-rise office building in Boston, MA.	Rose Associates NYC.
Codex Corporation World Headquarters: An analysis of project access alternatives, including traffic generation and access location and design criteria, was performed for a corporate headquarters development along Route 128. A traffic impact assessment was also conducted as part of an EIR analysis.	Codex Corporation Mansfield, MA.
North Hill Development: A traffic impact and project access analysis was conducted as part of an EIR for a life care community consisting of 375 multi-family dwelling units and a health care center.	Living Care Services Corp. Needham, MA.
South Shore Hospital: Traffic circulation, roadway improvement, parking and access analyses were performed as part of an EIR for a major hospital expansion.	South Shore Hospital Weymouth, MA.
Westborough Office Park: Areawide traffic operations, circulation and project access alternatives were evaluated as part of an EIR for this major office and research development project.	Leggat, McCall and Werner Boston, MA.
Westborough Technology Park: A traffic and parking study was prepared for the client, for submittal to the town of Westborough. Traffic operations, circulation, project access and parking analyses were conducted.	Valley View Assoc. Boston, MA.
Highland Acres Development: A detailed traffic impact, circulation and project access evaluation was performed as part of an EIR for a $64 million mixed-use development covering 360 acres in Salem, MA.	The Fafard Company Ashland, MA.
Stasinos Condominiums: A traffic study was performed for this 216 unit condominium and 30,000 SF commercial development, as part of an EIR analysis. Project access alternatives, traffic operations, and roadway improvements were evaluated.	Stasinos Corp. Lynn, MA.

EXHIBIT 3 (Continued)

HMM ASSOCIATES

RECENT MASSACHUSETTS TRAFFIC AND TRANSPORTATION PROJECTS (Cont'd)

PROJECT	CLIENT
Newton/Wellesley Hospital: A comprehensive traffic operations, parking and circulation study was performed for an expansion of the Newton/Wellesley Hospital.	Newton/Wellesley Hospital Newton, MA.
General Medical Associates Expansion Project: A traffic and parking study was performed for expansion of an existing medical office building in Weston, MA.	Medical Facilities Planning Associates Natick, MA.
Dedham Medical Associates Expansion: A detailed site evaluation, traffic impact and operations analysis was conducted for a proposed expansion of an existing medical office building.	Dedham Medical Associates Dedham, MA.
Newbury Street Development: Traffic impact analyses, including an assessment of operations, trip generation and site circulation were conducted for a proposed office development.	The Strehlke Company Framingham, MA.
101 Federal Street: Detailed traffic operations, circulation, access and parking analyses were performed as part of a development study for a proposed development in Boston's financial district.	Franklin Federal Partners Boston, MA.
Hynes Auditorium Expansion: A pedestrian circulation study, incorporating existing pedestrian counts, projections of future pedestrian activity, and evaluation of pedestrian capacities and levels of service were conducted for the proposed expansion of the Hynes Auditorium.	Massachusetts Convention Center Authority Boston, MA.
Lincoln School Renovation: An evaluation of traffic generation and impacts was conducted for a proposed conversion of a vacant school building to office use.	The Strehlke Company Framingham, MA.
Jonathan Maynard Office Center: A detailed traffic impact on operations assessment was conducted for a proposed office development in Framingham. Traffic operations, circulation and access were evaluated.	The Strehlke Company Framingham, MA.
Harrington Farms: Preliminary site circulation, project access and traffic operations analyses were conducted for a proposed 118 unit condominium development.	Westwood Development Westwood, MA.
Route 9 Office Development: Potential traffic and access impacts were evaluated for a proposed business-office development along Route 9 in Westborough, MA.	Westwood Development Westwood, MA.

EXHIBIT 4

HMM ASSOCIATES

RECENT AIR QUALITY STUDIES

PROJECT	CLIENT
International Place: Indirect source air quality modeling for a 2 million SF mixed use development in Boston.	The Chiofaro Company Boston, MA
Westborough Technology Park: Indirect source air quality modeling for a 900,000 SF R&D office park.	Valley View Association Boston, MA
Refuse Processing Facility: Air quality modeling for facility in Somerville, MA.	Alternative Resources, Inc. Sudbury, MA
Wood-fired Power Plant: Conducted air quality modeling and prepared PSD permit application.	Alternate Energy, Inc. Chester, ME
Paper Coating Facilities: Air quality modeling for facilities in West Springfield and Ware.	Ludlow Specialty Paper Ware, MA
Getty Mining Company: PSD permit application was prepared for new copper/lead/zinc mine and processing plant in Patten, ME.	E.C. Jordan Company Portland, ME
Madison Facility: Conducted dispersion modeling and prepared PSD permit application to demonstrate compliance for increased fuel consumption.	Madison Paper Industries Madison, ME
Medical Area Total Energy Plant: Permitting support and compliance testing for 42 MW cogeneration facility in Boston.	Cogeneration Management Co., Inc. Boston, MA
Dewey Square Transportation Systems Management Program: Detailed air quality analyses were performed as part of an EIR for program designed to improve traffic flow in the Boston financial district.	Sverdrup Parcel & Associates, Inc. Boston, MA
Boiler House Conversion: Conducted SO_2 and TSP concentration modeling and prepared PSD permit application for conversion to coal and wood.	Middlebury College Middlebury, VT
New Asphalt Batch Plant: Downwash modeling and permit assistance.	Whitcomb Construction Company Bellows Falls, VT
Rock Processing Plant: Conducted modeling of low level emissions of particulates and prepared PSD permit application to demonstrate compliance for increased production capacity.	Vermont Talc, Div. of Omya, Inc. Chester, VT
New England Ethanol Plant: Conducted air quality modeling and prepared PSD permit application for new plant in Lewiston, ME.	E.C. Jordan Company Portland, ME

EXHIBIT 4 (Continued)

New England Energy Park: As part of the EIR, air quality analyses were conducted. State permit applications were prepared for the new coal gasification plant in Fall River, MA.	EG&G Consultants Waltham, MA
Loring AFB Central Heating Plant: Conducted air quality modeling, BACT and impact analyses in the process of preparing PSD permit application for two coal-fired boilers.	Rust Engineering Company Pittsburgh, PA
New Pulp and Paper Mill: Performed modeling of air emissions and prepared PSD permit application for mill on the Black Warrior River in Alabama.	Independent Kraft Corporation Birmingham, AL
Parmaceutical Manufacturing Plant: Performed SIP revision for high sulfur fuel oil variance.	Pfizer, Inc. Groton, CT
Methanol Production Plant: Prepared PSD permit application for facility in Creswell, NC.	Peat Methanol Associates Creswell, NC
Soybean Oil Mill: Prepared PSD permit application for fuel conversion.	Hartsville Oil Mill Hartsville, NC
North Dakota Alcohol Cooperative: Performed PSD feasibility analysis for alcohol plant.	Planning Economics Group Woburn, MA
Montgomery Pulp and Paper Mill: Performed PSD feasibility analysis for expansion of mill.	Union Camp Corporation Savannah, GA
Hanscom AFB: Air quality impact analyses were conducted as part of an Environmental Assessment of alternative fuels for the central heating plant.	U.S. Army Corps of Engineers New York, NY
Missiquoi Specialty Board Plant: Prepared SIP revision for stack redesign.	Missiquoi Specialty Board Sheldon Springs, VT
Ethanol Production Plant: PSD permit application was prepared.	Diversified Fuels, Inc. Selma, NC
New Pulp and Paper Mill: Prepared PSD permit application for mill to be constructed in Augusta, GA.	Augusta Kraft Company Augusta, GA
Coffeen Steam Electric Station: Conducted air quality analysis and prepared SIP revision.	Central Illinois Public Service Company Springfield, IL
New Oil Refinery Siting Study: Conducted emissions offset feasibility study for use in siting new oil refineries.	Massachusetts Office of Energy Resources Boston, MA
Conesville Steam Electric Station: Air quality analyses and modeling were conducted in connection with preparation of SIP revision.	Columbus & Southern Ohio Electric Co. Columbus, OH

EXHIBIT 4 (Continued)

Franklin Paper Mill: Prepared PSD permit application for conversion to wood and coal.	Union Camp Corporation Franklin, VA
Naval Weapons Plant: An air quality impact analysis was performed as part of the preparation of a SIP revision for coal conversion.	Rockwell International Columbus, OH
Pine Hill Pulp and Paper Mill: Air quality analyses and PSD permit application were prepared for expansion of the mill.	MacMillan Bloedel, Inc. Pine Hill, AL
Perlite Plant: Prepared PSD permit application for expansion of the plant.	Carolina Stalite Company Gold Hill, NC

Noise

HMM Associates has extensive experience in transportation-related noise studies. Our noise monitoring work is done using our precision sound level equipment; our noise modeling work is done using state of the art noise modeling techniques. Our staff has worked on noise studies for large developments, for developments, for highway and rail projects and for airport noise. Our assignments have included both assessments of noise impacts and identification of means for minimizing noise impacts. Exhibit 5 presents a summary of our recent noise impact assignments.

6.2 Representative Projects

Copley Place

HMM Associates served as the prime environmental consultant for Copley Place. This assignment involved preparing submissions for City, State and Federal review. For this purpose, a joint EIR/EIS was prepared. Topics analyzed in the report included traffic, parking, air quality, noise, historic properties, visual quality, shadows, wind, geology/hydrology, utility and energy use, and socioeconomic impacts. The scope of the report was negotiated at both the State (EOEA) and Federal (EPA) level. In addition, very close coordination with the BRA was required throughout the project.

Due to the magnitude and controversial nature of the project, a Citizens Advisory Committee (CAC) was set up to encourage public participation in project review. In addition, a series of public meetings and hearings were held to present environmental impact findings to the public and neighborhood groups such as Neighborhood Association of Back Bay, Back Bay Architectural Association, FenPAC, United South End/Lower Roxbury Development Corporation, and the South End Project Area Committee. Mr. Scott McCandless, principal of HMM and Project

EXHIBIT 5

HMM ASSOCIATES

RECENT NOISE STUDIES

PROJECT	CLIENT
Devonshire Towers: Traffic noise levels were evaluated for a high rise residential project.	Devonshire Assoc. Boston, MA.
One Financial Center: Construction noise levels were evaluated to determine 60, 70, and 80 dBA isopleths around the site.	Rose Assoc. New York, N.Y.
Newton Corner: Traffic noise levels were evaluated (L_{eq}, L_{dn}) at 5 locations near the Mass. Pike to determine expected exterior and interior noise impacts for HUD project.	Vanasse/Hangen Brighton, MA.
Affiliated Hospitals Center: Construction and traffic noise levels were evaluated for a major hospital expansion project.	AHC Boston, MA.
Berry's Creek Center: Traffic and railroad octave baud noise levels were analyzed to determine interior noise levels in a large HUD mixed use development in New Jersey.	
South Shore Hospital: Traffic and construction noise impacts were evaluated. Interior noise levels associated with aircraft flyovers were measured.	South Shore Hospital Weymouth, MA.
Copley Place: Traffic and construction noise levels were modelled. HVAC noise levels were projected.	UIDC Boston, MA.
Baystate Medical Center: Helipad noise levels were modelled.	BayState Medical Ctr. Springfield, MA.
Rouse's Point Bridge: An octave baud noise level study was conducted for a bridge realignment in Vermont.	
Loring Central Heat Plant: Analysis of noise levels associated with a wood fired boiler and wood handling facility in Maine.	U.S. Air Force

Manager for the Copley Place project, conducted these meetings. At each meeting he made a prepared presentation and responded to the questions raised by attendees.

As prime consultant, HMM served as overall project manager for the Copley Place EIR/EIS preparation. This involved coordinating with project architects, project engineers from three separate firms, and managing several sub-consultants. When the report was completed, it was reviewed by BRA officials and a series of revisions were coordinated among all parties.

HMM Associates was successful in submitting the Draft and Final reports to the BRA on schedule and within the allotted budget. The report was accepted by all review agencies.

Hynes Auditorium

HMM Associates was selected as environmental consultant by the Massachusetts Convention Center Authority for the Hynes Auditorium expansion. Our work included preparing the Environmental Impact Report (EIR), and coordinating the Citizens Advisory Group process. In addition, close coordination with the BRA was required. Topics included in the EIR included traffic, parking, pedestrian circulation, wind, historic resources and land-use issues. HMM Associates was also responsible for organizing and conducting the citizen review process for this project, including making presentations at each meeting.

A key issue of concern to neighborhood groups was the type of events to be held at the Hynes in the future. HMM analyzed the market analyses, marketing plans and results, proposed building space allocations and other data to develop a schedule of expected event types at the Hynes. This information served as the basis for developing the design case for parking, traffic and pedestrian circulation analyses.

Devonshire Towers

HMM Associates assisted in scoping and compiled the Draft and Final EIR's for Devonshire Towers in Boston. The EIR for

this project studied many of the topics that are likely to be issues for this project. These include traffic, parking, noise, shadow, historical resources, and utility impacts. HMM Associates completed the EIR for Devonshire Towers within the schedule and the budget defined at the outset of the project. All documents were accepted by the EOEA as properly complying with their requirements.

Dewey Square

HMM Associates was the environmental consultant for the Dewey Square Tower currently under construction in downtown Boston. In this capacity we prepared the Draft and Final EIR's. This project involved close coordination with the BRA since City of Boston and State DPW land transfers were involved. Public transportation capacity was a key issue since parking in this project area was inadequate, and most trips to the site would be by public modes. Impacts to historical resources were analyzed carefully, particularly with respect to South Station and the adjacent Leather District. Wind, shadows, and construction impacts were also key issues. This project was completed on schedule and within budget. Our analysis was acceptable to all review agencies.

Westborough Technology Park

HMM Associates was the environmental consultant for the proposed Westborough Technology Park development, in Westborough, MA. Our work on this project involved the preparation of the Draft and Final EIRs. For the most part, these documents focused on the potential traffic and transportation-related air quality impacts of the development on the complex Research Drive/Computer Drive/Route 9 area of Westborough. Associated work on this project included close coordination with the Westborough Route 9/Lyons Street Association, a transportation advisory group consisting primarily of local businessmen. All project tasks

were completed on schedule and within budget. Our findings were approved by all review agencies.

6.3 References

1. Urban Investment & Development Company (client)
   Copley Place (project)
   Mr. Kenneth A. Himmel

2. Meredith & Grew
   Several
   Mr. Brian Fallon

3. Himmel/MKDG
   Several
   Mr. Kenneth Himmel

4. The Chiofaro Company
   Several
   Mr. Peter Berg

5. Goodwin Proctor & Hoar
   Several
   Ms. Susan Cooke

6. Massachusetts Convention Center Authority
   Hynes Auditorium
   Mr. Francis X. Joyce

7. Mr. Samuel Mygatt
   Executive Director, MEPA Unit
   Executive Office of Environmental Affairs

7. SCHEDULE AND BUDGET

7.1 Project Schedule

Upon authorization to proceed, it is anticipated that work will be scheduled to be performed in two phases over a period of approximately 3 months (90 days). The first phase will conclude with the presentation of preliminary findings, in report form, within one month (about 30 days) of contract award. These findings will address general alternatives for: (1) reducing overall traffic flow in the area; and (2) improving access to the Central Artery and Southeast Expressway. Other problems identified through the initial data collection and analysis phase will also be outlined, along with potential short- and long-term solutions.

A final report will be submitted to the Traffic and Parking Department within three months (about 90 days) of the authorization date. This report will contain more detailed evaluation of traffic flow improvement alternatives, in a form sufficiently complete to support policy decisions by the City.

A graphical presentation of the schedule for this project, on a task basis, is given in Exhibit 6.

7.2 Cost Estimate Per Task and Manpower Loading

Exhibit 7 provides the cost estimate per task and manpower loading. We understand that the City will reimburse HMM on a time and materials basis for an amount not to exceed $30,000.00.

Exhibit 8 presents HMM's billing rate schedule. Exhibit 9 is our standard terms and conditions.

7.3 HMM Financial Statement

HMM is a closely held firm and financial statements are not distributed. If required, HMM will make financial statements available for inspection by appropriate City of Boston purchasing agents. HMM has operated profitably since ints inception in 1978. Sales for each of the past two fiscal

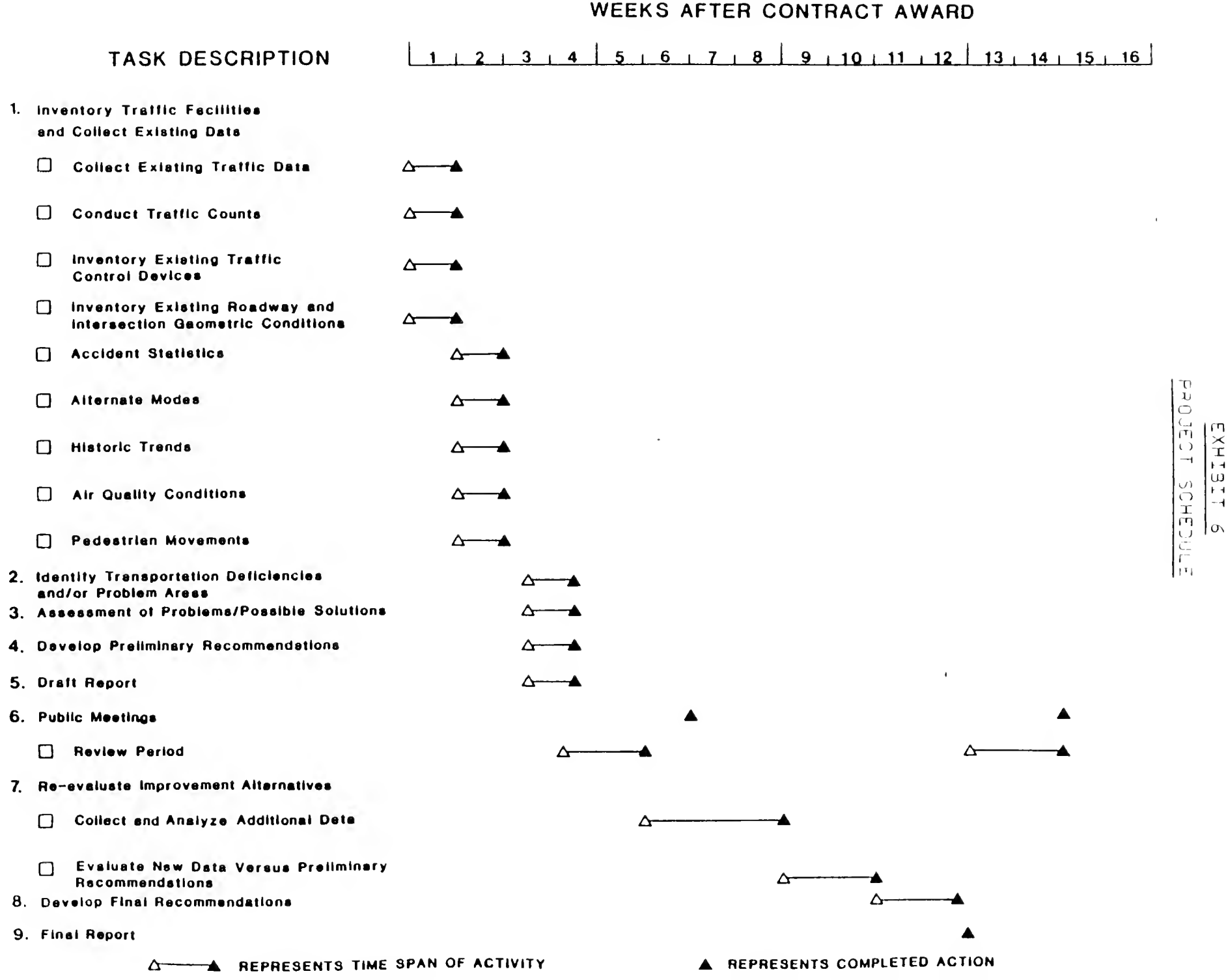


EXHIBIT 6
PROJECT SCHEDULE

EXHIBIT 7

COST ESTIMATE AND MANPOWER LOADING

Task	Manhours	Cost ($)
1. Inventory Traffic Facilities and Collect Existing Data	64	2,240.
2. Identify Transportation Deficiencies and/or Problem Areas	40	1,800.
3. Assessment of Problems/ Possible Solutions	84	4,200.
4. Develop Preliminary Recommendations	24	1,200.
5. Draft Report Preparation	40	1,800.
6. Review and Comment on Draft Report	12	600.
7. Collect and Analyze New Data	48	1,680.
8. Detailed Evaluation of Improvement Alternatives	64	3,200.
9. Final Report Preparation	40	1,800.
10. Review and Comment on Final Report	12	600.
Subtotal	428	19,120.
Direct Expenses		700.
TOTAL COST		$19,820.

EXHIBIT 8

HMM ASSOCIATES BILLING RATE SCHEDULE

June 1984

Billing Classification Level	Hourly Rates
BCL-1	$20
BCL-2	$25
BCL-3	$30
BCL-4	$40
BCL-5	$50
BCL-6	$60
Corporate Officers	$70

Hourly billing rates include salary, fringe benefits, overhead, general and administrative costs and profit. Other direct costs, such as travel, computer time and out of pocket expenses are billed at 110% of direct cost.

EXHIBIT 9

HMM ASSOCIATES STANDARD TERMS AND CONDITIONS

January 1983

PERSONNEL CHARGES

Fees for services are based on the time expended on the project by professional, technical, and clerical personnel. The fees will be computed by multiplying the hours worked on the project for each individual by the hourly rate corresponding to the billing classification level for the individual. These rates are determined by multiplying the individual's payroll burden by a factor of approximately two and one-tenth (2.1). The payroll burden is the sum of the direct payroll cost on an hourly basis plus twenty (20) percent of same to cover payroll taxes, insurance incident to employment, holidays, sick leave, vacations, etc.

Time spent in either local or inter-city travel when travel is in the interest of the work, will be charged for in accordance with the foregoing schedule.

Overtime hours worked will be charged for in accordance with the foregoing schedule for exempt employees and at a rate of one and three tenths (1.3) times the standard rate for nonexempt employees.

REIMBURSABLE EXPENSES

The following items of expense will be billed at our direct cost plus ten (10) percent service charge:

1. Transportation and subsistence expenses incurred for necessary travel, including:

   a. Use of personal or company vehicles at $0.20 per mile;
   b. Use of public carriers, rental cars, trucks, boats, airplanes or other means of transportation;

2. Shipping charges for samples, field test equipment, etc.;

3. Computer-based word processing system @ $5.00 per hour;

4. Telephone calls, telegrams, and cables;

5. Reproduction of drawings and reports, including photocopies at $0.10 per sheet;

6. Computer service charge;

7. Subcontracts; and

8. Other project related expenses.

INVOICES

Invoices will be submitted monthly for services performed. Payment will be due within thirty (30) days of the date of invoice. Interest will be added to accounts unpaid after thirty (30) days from invoice date at the rate of one and one-half (1.5) percent per month.

years have exceeded two million dollars. HMM has been previously audited by the Massachusetts Department of Public Works. The firm has maintained an exclusive banking relationship with Shawmut Needham Bank since the firm began operations in July 1978. Mr. Eugene Fischer, Assistant Vice President, is knowledgeable of the financial status of HMM and may be contacted for information at (617) 444-6000.

ROBERT D. KLIMM

Education

M.S.	Civil Engineering (Transportation), Northeastern University, 1979
B.S.	Civil Engineering, Worcester Polytechnic Institute, 1975

Summary of Experience

Mr. Klimm specializes in transportation/traffic engineering and planning and the coordination of environmental services related to transportation analyses. He has served as Project Manager for numerous transportation engineering and planning analyses conducted throughout the country, and has been the principal engineer in charge of transportation related issues for environmental impact analyses conducted for numerous project developments in the Boston Metropolitan area. He has been involved in traffic circulation and parking analyses; the preparation of traffic control designs, specifications and cost estimates; highway safety analyses, and the evaluation of transportation systems management strategies. Mr. Klimm is also responsible for transportation computer modeling and software development efforts. He has testified as an expert witness before State and Federal agencies.

Professional Experience

1980 - Present

HMM Associates. Project Manager and/or Principal Engineer for traffic engineering and transportation planning analyses. Project work has included traffic engineering for environmental impact analyses, coordination of environmental services related to transportation analyses, development and assessment of transportation control strategies, traffic flow simulation modeling, transportation computer software development and testing, traffic access and parking studies, and the development of traffic management plans. Mr. Klimm has directed transportation impact analyses for many large developments in the Boston Metropolitan area. These have included the following:

- Principal Engineer for the traffic, public transportation and parking analyses conducted as part of the MEPA EIR for the Dewey Square Office Building in Boston, MA.

- Principal Engineer for the traffic, air and noise impact assessments which included an analysis of project access alternatives, trip generation/ distribution/assignment and the development of

access location and design criteria for the MEPA EIR, conducted for the Codex Corporation World Headquarters in Canton, MA.

- o Principal Engineer for the areawide traffic operations and circulation analyses evaluated as part of the MEPA EIR for the Westborough Office Park in Westborough, MA.
- o Project Manager for a comprehensive traffic and parking study prepared for the Westborough Technology Park in Westborough, MA.
- o Principal Engineer for a detailed transportation impact and circulation assessment conducted as part of a MEPA EIR for the Highland Acres Development in Salem, MA.
- o Principal Engineer for traffic operations and roadway improvement studies prepared for the MEPA EIR on the Stasinos Development in Salem, MA.
- o Project Manager for a traffic and access impact study conducted for the Harrington Farms Development in Shrewsbury, MA.
- o Principal Engineer for a comprehensive traffic operating, parking and circulation study conducted for the Newton-Wellesley Hospital Expansion Project in Newton, MA.

1977-1980 Fay, Spofford & Thorndike, Inc. Transportation Engineer. Responsible for traffic operations analyses; traffic control design, specifications and cost estimates; transportation environmental impact analyses for major projects throughout Massachusetts; highway safety analyses; truck circulation studies, and traffic circulation plans for private and public developments.

1975-1977 Central Massachusetts Regional Planning Commission. Transportation Engineer/Planner. Responsible for traffic engineering analyses, transportation corridor planning studies, transportation systems management plans, traffic operations analyses, and coordination of the regional transportation air quality control plan.

Other Professional Data

Affiliations:
- Transportation Research Board: National Academy of Sciences
- Institute of Transportation Engineers
- American Society of Civil Engineers
- Boston Society of Civil Engineers

Seminars Attended:
- US DOT - Continuing Transportation Planning Seminar I, March 1976.
- US DOT - Continuing Transportation Planning Seminar II, March 1977.
- US EPA - Air Quality Analysis Workshop, November 1975.

Papers:

Author -
"Comparison of Optional Cycle Lengths for an Urban Arterial Signal System Using Maximum Bandwidth and Minimum Vehicle Delay Criteria," 1979
"Fringe Parking and Intermodal Transportation System--Feasibility Study," 1976.

PAUL J. HAJEC

Education

B.S.	Transportation Engineering, Worcester Polytechnic Institute, Worcester, MA, 1977
M.S.	Transportation Engineering, Northeastern University, Boston, MA, 1979

Summary of Experience

Mr. Hajec specializes in transportation/traffic engineering and planning and assists in the coordination of environmental services related to transportation impact analyses. He has served as Project Manager for several transportation engineering and planning analyses conducted throughout the country, and has been the senior engineer in charge of transportation-related issues for environmental impact analyses performed for numerous project developments in the Boston Metropolitan Area. He has been involved in traffic circulation and parking analyses; the preparation and evaluation of traffic control designs; highway safety research; and the evaluation of transportation systems management strategies. Mr. Hajec is also responsible for transportation computer modeling and special facility evacuation analyses conducted by HMM.

Professional Experience

1983-Present HMM Associates, Project Manager, Principal and/or Assistant Engineer for traffic impact and transportation planning analyses. Mr. Hajec's experience in traffic/transportation analyses includes the following:

- Project Manager for a traffic access and impact study conducted for the Dedham Medical Associates Expansion Project in Dedham, MA.
- Principal Engineer for a traffic access and impact study completed for the General Medical Associates Expansion Project in Weston, MA.
- Principal Engineer for a traffic and access impact study prepared for the Strehlke Company's Jonathan Maynard School Redevelopment Project in Framingham, MA.
- Assistant Engineer for a traffic and access impact study completed for the Strehlke Company's Newbury Street Development Project in Framingham, MA.

- Assistant Engineer for a comprehensive traffic and parking study prepared for the Westborough Technology Office Park in Westborough, MA.

- Assistant Engineer for traffic operations and roadway improvement studies conducted as part of the MEPA EIR on the Stasinos Condominium Development in Salem, MA.

- Assistant Engineer for a comprehensive traffic operations, parking and circulation study performed for a proposed development at 101 Federal Street in Boston, MA.

1980-1983 Merrimack Valley Planning Commission, Haverhill, MA.
Responsibilities included working in supervisory capacities in all aspects of the regional transportation planning program. Emphasis was placed on developing and managing diverse traffic engineering studies for use in updating the regional transportation plan.

Regional projects focused on: intersection analysis studies; a vehicle occupancy study; and travel time and delay studies.

Local projects included: a traffic circulation and parking study for the Town of Amesbury; and the preparation of a highway improvement funding guidebook for cities and towns in the Merrimack Valley Region.

1979-1980 Virginia Highway & Transportation Research Council, Charlottesville, VA.
Served as a highway safety research engineer with responsibilities encompassing all aspects of research pertaining to highway safety and traffic engineering.

Position duties included: experimental design; data collection and analysis; and the preparation of reports. Also worked as project manager for the development of a computerized safety records system for intracity bus operations, and a series of statewide traffic engineering studies.

Professional Societies

Institute of Transportation Engineers
American Society of Civil Engineers

Reports

"An Analysis of the Use of Aggregate and Disaggregate Models in the Prediction of Accidents Involving Heavy Trucks," 1979.

MARGARET B. BRIGGS

Education

B.A. Biology, Middlebury College, 1978

Summary of Experience

As an Associate and Project Manager at HMM Associates, Ms. Briggs is responsible for overall management of projects ranging from EIR's for large real estate developments to studies in support of local hearings. She has six years of experience directing projects through the Massachusetts Environmental Policy Act (MEPA) process, as well as other state, local and Federal processes. As Project Manager, she is responsible for the technical content and presentation of each report, and is experienced in presenting study results to agencies and public groups. Her technical expertise lies in the areas of wetlands, land use, visual impacts, and project coordination.

Professional Experience

1979 - Present

HMM Associates, Associate and Senior Project Manager. Ms. Briggs has directed over a dozen Massachusetts Environmental Impact Report projects. Her responsibilities include technical management, managing sub-contractors, agency liaison and presentations to public groups. Topics included noise, traffic, wetlands, aesthetics, air quality, socio-economics, drainage, wind, land use and cultural resources. Other studies she has managed have been in support of local ordinances including wetland protection and zoning hearings.

Recent project assignments have included:

- Hynes Auditorium Expansion. Directed studies including historic impacts, land use, aesthetics, traffic and wind. Responsible for managing and running extensive citizen participation program.
- Highland Avenue Condominiums. Managed preparation of EIR for condominium development in Salem covering traffic and wetland issues.

- Westborough Technology Park. Completed extensive data collection effort and EIR submission for a 900,000 SF project in record time.

- Salem Woods Development. Responsible for preparation of EIR analyzing traffic, air quality, drainage and wetland issues.

- Loring Air Force Base Heat Plant Conversion. Responsible for analyzing the socioeconomic impact on the lumber and wood products industry in Maine resulting from potential conversion to wood fuel.

- One Financial Center. Served as principal investigator analyzing transportation, air quality, historic and visual impacts in Boston.

- South Shore Hospital. Ms. Briggs managed the EIR for this project, studying traffic, parking, noise and air quality impacts.

- Maynard School, Framingham. Served as Project Manager for a re-use project requiring traffic analysis. Involved in special permit hearing.

During the course of her assignments, Ms. Briggs has dealt extensively with Massachusetts and local environmental permitting and review agencies. She has helped negotiate State scoping requirements, State and local DPW requirements and local wetlands permits. She has represented clients at public meetings and hearings.

1978 — Palmer & Dodge. Ms. Briggs worked as a legal assistant on cases related to environmental issues. She was responsible for editing pre-trial testimony and examining technical laboratory data related to a litigation case.

Prior to 1978 — Prior work involved botanical and ecological studies including ecosystem identification, plant taxonomy and marine microbiology.

WILLIAM GROOT

Education

M.S.	Atmospheric Science, Drexel University, 1978
B.A.	Physics, Rutgers University, 1976

Summary of Experience

Mr. Groot is an air pollution meteorologist with experience in air quality monitoring and modeling, statistics, climatology, and data processing, for stationary and indirect source impacts. He is also involved in software design of atmospheric models.

Professional Experience

1980-Present — HMM Associates. Meteorologist.

Mr. Groot is currently responsible for atmospheric dispersion modeling of stationary sources for PSD applications and SIP revisions and modeling of indirect sources. Other current assignments include analysis of field monitoring data for the Medical Area Total Energy Plant (MATEP) in Boston and the preparation of EIR's for proposed office/retail and residential facilities in Massachusetts. Recent projects include:

- Project Manager of an atmospheric dispersion modeling analysis in support of an Air Permit Application for a proposed wood-fired power plant in Chester, Maine.
- Analysis of wind tunnel data on pedestrian level wind velocities around three newly proposed projects for downtown Boston.
- Development of a variable trajectory radiological dose assessment computer program on an IBM PCXT for the Vogtle Electric Generating Station in Georgia.
- Responsible for atmospheric dispersion modeling of particulate matter categories and organic substances for the Medical Area Total Energy Plan in Boston. Project tasks also include the ongoing analysis of field data from the MATEP ambient air monitoring program.
- Project Manager for the EIR of the proposed Regency Towers high-rise in New Bedford.

- Responsible for the preparation of the EIR for International Place at Fort Hill Square in Boston.
- Refined atmospheric dispersion modeling for a revised air emission license application for Madison Paper Industries in Madison, Maine.
- Air quality analysis of the Dewey Square Transportation Management Program in Boston.
- Developed an IBM Version of the EPA UNAMAP-5 computer programs.

1979 Impact Environmental Consultants, Ltd., Denver, Colorado, Meteorologist. Directed air quality and monitoring programs for a proposed uranium mine and mill operation. Also involved in licensing work for a second mill site in southern Colorado. Performed a critical review of the UDAD dispersion model for the American Mining Congress.

1978-1979 United Engineers and Constructors, Inc., Philadelphia, Pennsylvania, Meteorologist. Dispersion analysis of stationary sources using EPA models and preparation of EISs. An impact study of existing and proposed coal-fired power plants in Allegheny County, Pennsylvania involved both monitoring and modeling to determine SIP emission limits. This project resulted in a calibrated version of the RAM model for the region. Other validation studies of EPA models addressed terrain effects.

1977-1978 Drexel University, Philadelphia, Pennsylvania, Research Assistant. Analyzed meteorological data from the Nimbus 6 satellite. Work involved statistical calculations and data processing.

1976-1977 Drexel University, Philadelphia, Pennsylvania, Teaching Assistant. Taught courses in physics and computer science.

Professional Affiliations

American Meteorological Society
Air Pollution Control Association
Sigma Pi Sigma - National Physics Honor Society

THOMAS C. HOUSTON, AICP, PE.

Education

MS, 1979, Transportation, Northeastern University
MUA, 1974, Urban Affairs, Boston University
BSCE, 1971, Civil Engineering, Northeastern University

Summary of Experience

As a senior engineer and Project Manager, Mr. Houston has extensive professional experience encompassing site/civil engineering, transportation, environmental impact assessments, and regulatory compliance. His experience in site/civil engineering extends from design through construction services for major land development projects. As a transportation engineer his experience includes traffic analysis, planning, and design of roadways, intersections, and limited access highways. In the preparation of environmental impact assessments, he has served as Project Director and principal investigator responsible for the preparation of EIS and EA studies in accordance with environmental legislation and implementing regulations at the Federal and State levels.

Professional Experience

1984 - Present — HMM Associates. Senior Engineer/Project Manager. Mr. Houston directs diverse projects involving civil/site engineering, transportation, and environmental assessment. Representative projects include:

- o EIR Workman's Circle Project, Ashland involving wetland and sanitary sewer impacts.
- o EIR 101 Federal Street, Boston involving area wide impacts on combined sewers and water quality.
- o EIR Lyons Street Building, Westborough involving area wide and localized impacts.
- o Feasibility and Cost Overview, Framingham, MA.
- o Environmental Certification and Permitting, 150 Federal Street, Boston, MA.

1982-1984 — Norwood Engineering Company, Associate Director of Engineering. His responsibilities included directing a number of major site/civil engineering, transportation, and environmental assessment/regulatory compliance projects.

- o Drum Hill Technology Center, Chelmsford/ Lowell involving site engineering, and services during construction
- o Research/Development Buildings, Lots J-6 and J-7, Norwood involving site engineering and permit compliance.
- o River Oaks Apartments, Canton involving site engineering for 110 dwelling units.
- o E.P. Seaver Condominia, Boston, involving conversion of the former School into condominium units.
- o Lost Brook Business Park, Norwood involving site engineering, permit compliance, EIR preparation and transportation analysis for 60 acre research and development facility.
- o Addition Hill Industrial Park, Marlborough involving roadway design, site engineering, and EIR preparation.
- o Number One Downey Street, Norwood involving permit compliance and services during construction.

1981-1982 GTE Strategic Systems Group, Environmental Manager, Program Office. Responsible for development and administration of a comprehensive environmental management program encompassing all aspects of the two billion dollar MX C^3 System.

1980-1981 WCH Industries, Director of Environmental Planing. Responsible for management of all projects in area of environmental impact assessment and regulatory permit compliance.

- o EIS - Over the Horizon Backseater Radar System, State of Maine.
- o EIS - Sewage Slude Disposal Facility - Nut Island Facilities Plan.
- o EIR - Seaport Facilities at South Boston.

1977-1980 Storch Engineers, Project Manager and Associate. Mr. Houston was responsible for the management and successful completion of diverse assignment including:

- Five Corners Intersection, Braintree, MA.
- Route 23 Urban Renewal Project, Wayne Township, NJ
- Transportation Improvement Project, Chelsea, MA
- Washington St. Urban Systems Project, Norwood, MA
- Water Resources Improvement Study, Island End River, Chelsea, MA.

1971-1977 Metcalf & Eddy, Inc., Project Engineer. Responsible for overall engineering analysis and design for various projects including:

Professional Affiliations/Registrations

PE · Professional Engineer
AICP · Charter Member, American Institute of Certified Planners

DAVID N. KEAST

Education

B.A.	Amherst College, 1952
B.S., M.S.	Electrical Engineering, Massachusetts Institute of Technology, 1954

Summary of Experience

Mr. Keast specializes in all aspects of acoustics and noise-control engineering. He brings 28 years of experience in the field to HMM. His work has included evaluating environmental noise impacts of industrial, utility, highway and airport noise sources as well as architectural acoustics and employee noise exposure problems. He has developed noise control measures for all types of facilities and machinery. He has experience in studying the meteorological aspects of outdoor sound propagation. Mr. Keast is skilled in the measurement and analysis of sound, vibration, pressure transients, and other physical parameters.

Professional Experience

1983 - Present: HMM Associates. Vice President and Senior Project Manager. Mr. Keast directs acoustic and vibration studies at HMM Associates. He is involved in projects related to transportation, utility and industrial noise, and in the design of noise-control treatments. He is also working on computer modeling of optimal siren placement and design of audible alert systems. Mr. Keast's recent projects include:

- Design of noise-control treatment for a chiller compressor, classroom building, Northeastern University.
- Environmental noise-impact and analysis for a proposed waste-processing facility in Somerville, MA.
- Analysis of community noise problem and recommendation of noise-control measures for an all-night warehouse distribution facility in Westborough, MA.

1973-1983 Bolt Beranek and Newman, Inc. Manager, Environmental Technologies Department.

In this position, Mr. Keast was responsible for coordinating BBN's multidisci- plinary environmental impact studies and energy systems analyses. His more recent activities involved management of major projects evaluating the environmental impacts of industrial and power plants and high-voltage power transmission lines. He was active in applications of acoustics to building energy conservation, and in the design of public warning systems utilizing sirens.

1971-1973 M.F.E. Corporation, Salem, NH, Vice President of Engineering.

At M.F.E. Corporation, Mr. Keast was responsible for design, engineering, manufacturing and marketing of instrumentation.

1954-1971 Bolt Beranek and Newman, Inc., Acoustical Consultant.

Mr. Keast spent his first 17 years at BBN working on projects related to acoustics, noise control, and the measurement of sound and vibration.

Professional Registrations/Affiliations

Acoustical Society of America (Fellow)
Institute of Electrical and Electronic Engineers (Senior Member)
Affiliate Member of the Institute of Noise Control Engineering

Books

Measurements in Mechanical Dynamics, McGraw-Hill Book Company, Inc., New York, NY (1967).

"Basic Sound Measuring System," Chapter 5 of Noise Reduction, L.L. Beranek, McGraw-Hill Book Company, Inc., New York, NY (1960).

Brief articles on Sound Measurement Apparatus, Encyclopedia of Science, McGraw-Hill Book Company, Inc., New York, NY (1960, 1965, 1980).

Technical Papers and Selected Reports:

"On the Prediction of the Attenuation of Sound Propagated Over Ground," (with F.M. Wiener), J. Acoust. Soc. Am. 29 1953 (1957) (A).

"Instrumentation for the Study of the Propagation of Sound Overground," (with F.M. Wiener and K.N. Goff), J. Acoust. Soc. Am. 30, pp. 860-966 (1958).

"An Empirical Method for Estimating Wind Profile Over Open Level Ground," (with F.M. Wiener), Trans. Am. Geophys. Union 39, pp. 858-864 (1958).

"Equipment and Procedures for Field Measurements of Aircraft Noise and Flight Paths," (with W.E. Clark and W.J. Galloway), J. Acoust. Soc. Am. 30, p. 693 (1958) (A).

"Experimental Study of the Propagation of Sound Over Ground," (with F.M. Wiener), J. Acoust. Soc. Am. 31, pp. 724-733 (1959).

"Calibration of Accelerometers in a Simulated Space Environment," J. Acoust. Soc. Am. 31, pp. 584-587 (1959).

"Acoustic Instrumentation for Measurements in the Minuteman Missile Silo," (G.W. Kamperman), J. Audio Eng. Soc., pp. 180-184 (1960).

"Measurement of Rocket Engine Noise," Noise Control 7, pp. 25-36 (1961). (Invited paper at the 60th Meeting of the Acoustical Society of America.)

"Acoustical Measurements in the 1/3-Scale Minuteman Missile Silo," 29th Symposium on Shock, Vibration and Associated Environments (November 1960).

"An Analog System for the Analysis of Random Data Signals Up to 10 Kilocycles," IRE Transactions on Instrumentation, I-II, pp. 52-57 (September 1962).

"Airborne Vibration Spectrum Analysis: Some Techniques and Limitations," (with J. Gibbons and W.E. Fletcher), 31st Symposium on Shock, Vibration and Related Environments (October 1962).

"Digital Computer Processing of Telemetered Vibration Data," (with W.E. Fletcher and J. Gibbons), J. Acoust. Soc. Am. 34, 1962 (A).

"Noise and Vibration Characteristics of Large Solid Rocket Motors with Thrust Vector Control," (with P.A. Franken and D.E. Newborough), J. Acoust. Soc. Am. (1964) (A).

"Some Studies of Titan II Noise and Vibration Data," (with P.A. Franken), J. Acoust. Soc. Am. (1965) (A).

"Analog Versus Digital Data Analysis: An Introduction," SAE Paper 650818 presented at the SAE National Aeronatucs and Space Engineering and Manufacturing Meeting in Los Angeles (October 1965).

"A Survey of Graphic Input Devices," Machine Design (August 1967).

"The Noise Environment of the California Condor," BBN Report 1259 (October 1965).

"Summer Acoustic Environment of the Jamesport and Shoreham Sites," BBN Report 2656 (October 1973).

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"Ambient Noise Studies in Suburban and Rural Areas," (with E.W. Wood and J.D. Barnes); invited paper presented at InterNoise '74, Washington, DC (September 1974).

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"Attenuation of Northern Dwellings to a Linear Source of Noise," (with D.A. Driscoll and J.P. Dulin, Jr.), J. Acoust. Soc. Am. 63 Supp 1, (A) May 1978).

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"Energy Conservation and Noise Control in Residences," a paper presented at Noisexpo '79, Chicago, April 1979, and reprinted in S/V Sound and Vibration, p. 18-22, July 1979.

"Acoustic Location of Air-Infiltration Openings in Buildings," invited paper presented at InterNoise '79, Warsaw, September 1979.

"The Use of Sound to Locate Infiltration Openings in Buildings," Proceedings of the ASHRAE/DOE-ORNL Conference on Thermal Performance of Exterior Envelopes of Buildings, ASHRAE SP 28, pp. 85, 1981.

"Electrical Substation Design Practice in the United States and Its Influence on Transformer Noise in Surrounding Communities," Proc. InterNoise '81, pp. 627, 1981.

FRANK P. VITALE

EDUCATION

B.L.A. Landscape Architecture, Louisiana State University, 1971.
One Year Forestry, University of Idaho, 1965-66.
Course work Architecture, Columbia University, 1967; Journalism, New School for Social Research, 1974.

SUMMARY OF EXPERIENCE

Mr. Vitale has acquired more than eight years of experience while working with environmental consulting, engineering, and architectural/planning firms. He was Coordinator of Special Projects under a U.S. Environmental Protection Agency contract dealing with oil and hazardous material emergency spill response. He has also managed environmental impact assessments for a wide range of projects. He has managed an EIS for an over one million square foot enclosed regional shopping center. He was the project manager for a site feasibility environmental study of a marine terminal on Lake Ontario that would serve as a truck-trailer transfer point for cargoes bound between the U.S. and Canada. In addition, he has managed the land use and socioeconomics segments of environmental impact assessments for natural gas pipelines and nuclear, fossil-fuel, and hydroelectric generating and transmission facilities located throughout the U.S.

Mr. Vitale also has had experience in managing international projects. He has prepared a study which recommends environmental guidelines for the development of a large industrial park in the industrial city of Yanbu, Saudi Arabia. He has also been involved in emergency planning activities at nuclear power plants. He has prepared radiological emergency response plans and emergency implementing procedures. He has prepared training materials for response personnel and was a controller at a nuclear plant during a practice exercise.

PROFESSIONAL EXPERIENCE

1982-Present HMM Associates. Mr. Vitale directs and participates in projects involving comprehensive environmental impact assessments, site feasibility studies and emergency planning studies for nuclear facilities. On behalf of a major pulp and paper manufacturer, he has directed the preparation of a petition to a federal agency for emergency relief from natural gas curtailment. He has been involved in the preparation of a hazardous waste procedures manual for a large petroleum company. Mr. Vitale has been involved in a wide range of emergency

planning activities at nuclear sites. He has acted as a County Coordinator in Indiana in the preparation of radiological emergency response plans and emergency implementing procedures. He has also been involved in training of both onsite and offsite emergency response personnel in Indiana and Arizona. He has reviewed and critiqued emergency response plans and has acted as controller in an emergency facility during an exercise at a nuclear plant.

1979-1982 Ecology and Environment, Inc. (E & E), Buffalo, N.Y. Mr. Vitale acted as Sr. Project Manager for a number of environmental impact assessments involving large commercial, industrial, institutional, and energy-related facilities. He acted as Special Projects Coordinator for a U.S. EPA contract and was responsible for administering a $1.2 million fund and coordinating the efforts of 12 technical assistance teams located in major U.S. cities. He managed an environmental impact study of a $150 million commercial development and coordinated the work of six different outside consultants. He directed environmental site studies for planned port facilities on Lake Ontario. He was responsible for the land use/socioeconomic evaluations in environmental assessments of LNG terminals sited along the gulf Coast and for natural gas pipelines extending from Canada through various western and New England States.

Internationally, Mr. Vitale prepared a report for the Saudi Arabian Royal Commission in Yanbu, Saudi Arabia, outlining environmental guidelines for an industrial park located adjacent to a large petrochemical complex. For a major U.S. oil company planning an LNG terminal and residential support community in Indonesia, he was responsible for preparing a strategy for a socioeconomic survey of the project area.

1977-1979 Environmental Writer/Photographer, N.Y., N.Y. Articles published in N.Y. Times and national environmental newsletters.

1976-1977 Sierra Club, N.Y., N.Y. Editor of "National Wildlife Newsletter" which circulated nationwide to environmental groups, government agencies, and concerned citizens.

1976 Environmental Protection Bureau of the State of New York, N.Y., N.Y. Project investigator involved in a study of N.Y. City's water supply and distribution system.

1973-1976 Envirosphere Co., (Division of Ebasco Services, Inc.) N.Y., N.Y. Assoc. Environmental Planner involved in environmental assessments of nuclear, fossil-fueled, and hydroelectric generating facilities. He was responsible for performing land use/socioeconomic analyses for planned site facilities and electrical transmission line corridors. He was instrumental in developing a project data base and mapping system for an environmental and route selection study of 500kV electrical transmission lines planned within a study area in Arizona and Utah of more than 23,000 sq. mi. He was also involved in the application of computer programs and graphics to coordinate and map environmental information. He performed visual and aesthetic analyses with the aid of computer view programs and participated in the development of guidelines for a park planned along a pump-storage reservoir in the state of Washington.

1972-1973 Noval C. While and Assocs., Brooklyn, N.Y. Landscape Architect involved in the design of recreational parks built atop sanitary landfill sites on Long Island, N.Y. He performed research into problems of landfill reclamation and developed guidelines for establishing and maintaining various types of vegetation on landfills. In addition, he monitored an experimental planting program on a newly completed landfill and compared results with the successes and failures at other landfill sites located in the U.S., Canada, and Europe.

PUBLICATIONS

"Establishment of Vegetation on Completed Sanitary Landfill Sites within the Pine and Scrub Oak Barrens of Eastern Long Island", Norval C. White & Assoc., July, 1973.

"Maintenance of Vegetation at Holtsville Park Sanitary Landfill, Holtsville, Long Island", Norval C. White & assoc., August 1973.

"A Who's Who of the Tree World", The New York Times, May 29, 1977.

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APPENOIX B

INTRODUCTION TO SERVICES

AUTHOR

TITLE

DATE LOANED	BORROWER'S NAME